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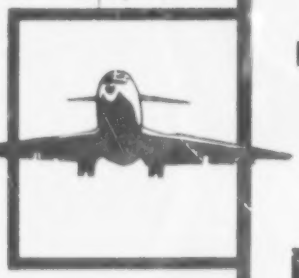

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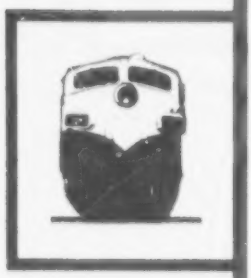
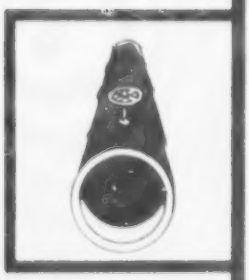


WASHINGTON, D.C. 20594

MARINE ACCIDENT REPORT

SINKING OF THE U.S. FISHING VESSEL SANTO ROSARIO ABOUT 35 NAUTICAL MILES EAST OF NEW SMYRNA BEACH, FLORIDA JULY 23, 1984



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16. Abstract About 0430 on July 23, 1984, the 70.5-foot-long U.S. fishing vessel SANTO ROSARIO, while fishing for calico scallops about 35 nautical miles east of New Smyrna Beach, Florida, capsized and sank. Three crewmembers were rescued by a fishing vessel nearby, but the fourth crewmember, sleeping below deck, went down with the vessel and was drowned. The vessel's estimated value was $250,000.

The National Transportation Safety Board determines that the probable cause of the capsizing and sinking of the fishing vessel SANTO ROSARIO was the agreement between the fishermen and the Canaveral Seafood Company to pile enough scallops on deck to accommodate 1 1/2 hours of pierside unloading time, which reduced the stability of the vessel to the point that a small shift in the vessel's deckload capsized the vessel. Contributing to the accident was the practice of using converted shrimp trawlers for scallop fishing, which do not have sufficient stability for this type of operation. Contributing to the death of the sleeping fisherman below deck was the lack of any means to warn him before the vessel overturned.

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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594

MARINE ACCIDENT REPORT

Adopted: April 18, 1986

SINKING OF THE U.S. FISHING VESSEL SANTO ROSARIO ABOUT 35 NAUTICAL MILES EAST OF NEW SMYRNA BEACH, FLORIDA JULY 23, 1984

INTRODUCTION

This accident was investigated jointly by the National Transportation Safety Board and the U.S. Coast Guard. A public hearing was held in Cape Canaveral, Florida, on August 21 through 23, 1984. This report is based on the factual information developed by the investigation and analyses made by the Safety Board. The Safety Board has considered all the facts that are pertinent to the Safety Board's statutory responsibility to determine the cause or probable cause of the accident and to make safety recommendations.

The Safety Board's analyses and recommendations are made independently of the U.S. Coast Guard. To inform the public of all Safety Board recommendations and the responses to the recommendations, a notice of all recommendations and responses is published in the Federal Register.

SYNOPSIS

About 0430 on July 23, 1984, the 70.5-foot-long U.S. fishing vessel SANTO ROSARIO, while fishing for calico scallops about 35 nautical miles east of New Smyrna Beach, Florida, capsized and sank. Three crewmembers were rescued by a fishing vessel nearby, but the fourth crewmember, sleeping below deck, went down with the vessel and was drowned. The vessel's estimated value was $250,000.

The National Transportation Safety Board determines that the probable cause of the capsizing and sinking of the fishing vessel SANTO ROSARIO was the agreement between the fishermen and the Canaveral Seafood Company to pile enough scallops on deck to accommodate 1 1/2 hours of pierside unloading time, which reduced the stability of the vessel to the point that a small shift in the vessel's deckload capsized the vessel. Contributing to the accident was the practice of using converted shrimp trawlers for scallop fishing, which do not have sufficient stability for this type of operation. Contributing to the death of the sleeping fisherman below deck was the lack of any means to warn him before the vessel overturned.

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INVESTIGATION

The Accident

The U.S. fishing vessel SANTO ROSARIO, with its captain and three deckhands onboard, departed Port Canaveral, Florida, on July 22, 1984, to fish for calico scallops. On July 23, the SANTO ROSARIO joined the fishing vessel CAPTAIN ED with one boat following the other in the Atlantic Ocean about 35 nautical miles (nmi) east of New Smyrna Beach, Florida. (See figure 1.) The wind, veering from the southeast to the southwest, was blowing at 10 to 15 knots. The air temperature was 70° F, the water temperature was 70° F to 80° F, and there were swells of 3 feet from the south with a 1-foot, wind-induced chop. The sky was overcast, but the visibility was 5 nmi.

About 0430, 1/ with the SANTO ROSARIO on automatic pilot, the captain and two deckhands on the SANTO ROSARIO brought in the last haul of calico scallops before returning to Port Canaveral. The full tail bag 2/ on the end of the port net had been lifted and hung on the deadman. 3/ The full tail bag on the end of the starboard net had been raised and set on top of an 8-foot-high pile of scallops on the main deck. As the captain and winch operator at the winch forward of the scallop pile were attempting to drag the "pull ahead line" (whip line on the winch) so that the after deckhand could place its free end around the bag in preparation for hauling the bag into position on the scallop pile and emptying it, the bag slid to the port side. This movement caused the deckload of scallops to shift to port. The vessel rolled several times from side to side and then assumed a 45-degree port list. The after deckhand grabbed and held on to the starboard tail bag to save himself from being pushed overboard as the vessel rolled. The captain testified that he ran to the wheelhouse to shift the steering from automatic pilot to manual control to maneuver the vessel into the swell and right it from the port list. However, in less than 1 minute the SANTO ROSARIO laid over on its port side and overturned.

A few minutes before the accident, the captain of the CAPTAIN ED was at the end of a tow, dragging for scallops about 1 nmi north of the SANTO ROSARIO's location. As he walked to the stern of his vessel to direct emptying the tail bags, he observed the SANTO ROSARIO's lights and thought that the vessel was departing for Port Canaveral. Shortly thereafter, when he came back to the wheelhouse, he could not see the lights. He called the SANTO ROSARIO on his citizens band (CB) radio and VHF-FM radiotelephone but got no answer. He could not see the vessel on his radarscope. After the tail bags on the CAPTAIN ED were emptied, the captain stopped fishing and began moving his vessel at 9 knots toward where he last saw the lights of the SANTO ROSARIO, stopping the engine occasionally to listen and use the searchlight. The moon was out and bright. Within 10 minutes he found the overturned SANTO ROSARIO with three survivors on the stern. He maneuvered close to the vessel while his crew tossed life preservers and a line to the survivors who were safely brought aboard. He testified that his vessel's stabilizers (paravanes) were down 30 feet on either side, and as he backed away quickly so they would not get caught on the submerged hull, the SANTO ROSARIO sank bow first at about 0445 before he got completely away from it. As soon as he came aboard, the captain of the SANTO ROSARIO informed the captain of the CAPTAIN ED that a third deckhand had been asleep in the berthing space forward on the SANTO ROSARIO and did not escape

1/ All times are eastern daylight saving time based on the 24-hour clock.
2/ A cylindrical net that holds the catch of calico scallops at the end of a large net.
3/ A securing line that led from the top of the boom to hold a tail bag full of scallops in the water alongside the vessel before the tail bag was to be emptied.

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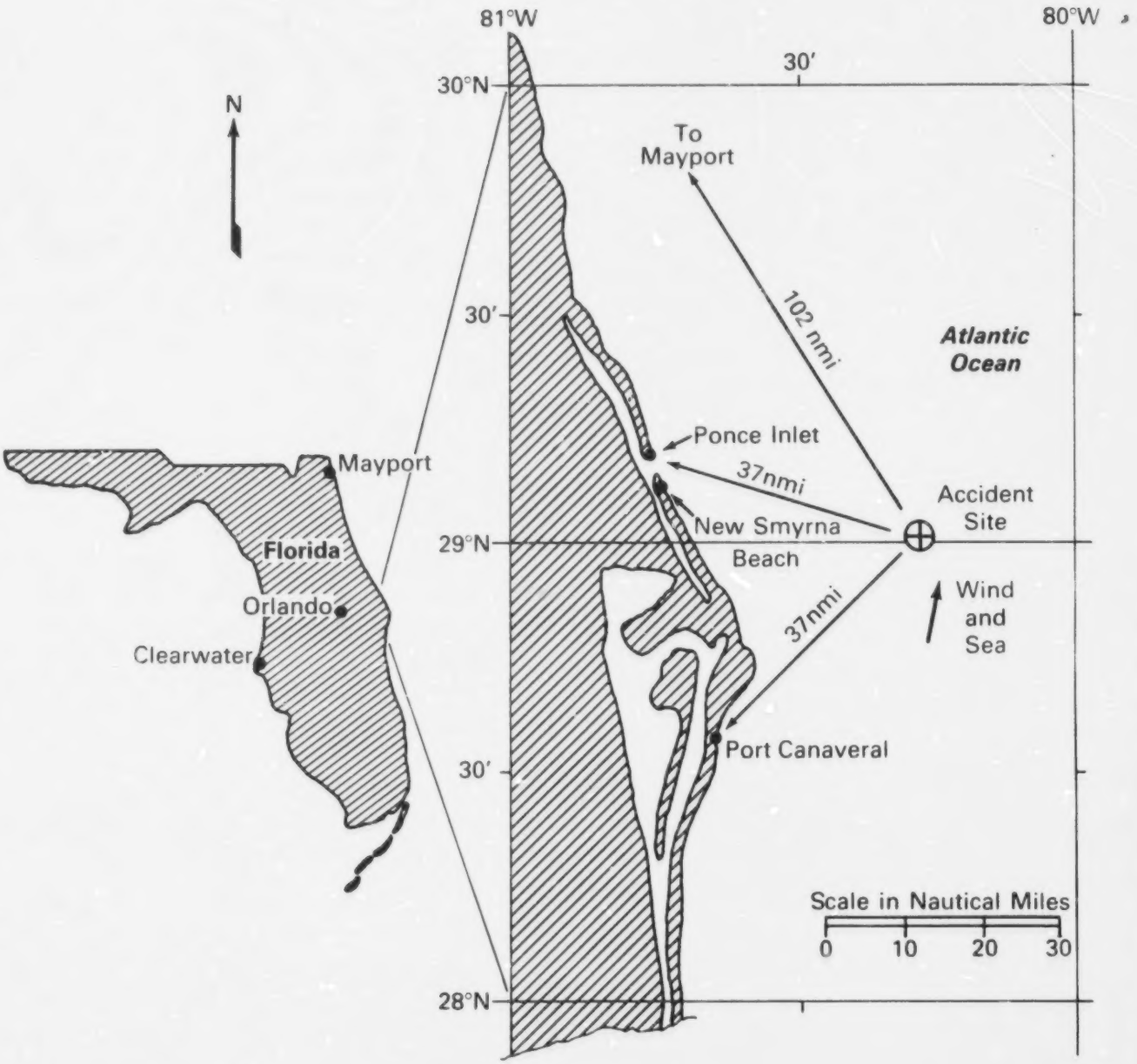

Figure 1.--Chart of Atlantic Ocean depicting accident site and distances to Coast Guard stations from accident.

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from the vessel before it sank. The CAPTAIN ED's searchlight was shining on the SANTO ROSARIO as it went down. The captain of the CAPTAIN ED stayed in the area about 15 minutes searching for the third deckhand, but no one saw him surface. He recorded the Loran position, 44187.0 and 61804.0, and the sounding of 25 fathoms of water where the vessel sank, and after informing the U.S. Coast Guard of the sinking, he set a course for Port Canaveral, as the crew administered first aid to the survivors.

Damage

A week after the accident a diver hired by the insurance agent of the vessel's owner made an underwater survey of the vessel. He found the rigging damaged but no structural damage to the hull. No attempt was made to raise the sunken vessel, valued at $250,000.

Crew Information

The crew consisted of the captain and three crewmembers, all of whom were experienced fishermen. The captain had operated the SANTO ROSARIO for 5 years and held a Coast Guard license as operator of vessels of not more than 100 gross tons, although he was not required to have one for the SANTO ROSARIO. The winch operator had been aboard 1 month, the tail bagman 3 weeks, and the deceased crewmember about 2 weeks. (See appendix.)

Vessel Information

The uninspected SANTO ROSARIO was a shrimp trawler that had been converted for scallop fishing, which required heavier nets and rigging. The vessel was built in Larose, Louisiana, in 1973 and was owned by Winyah Bay Products, Inc., of Georgetown, South Carolina. The steel-hulled vessel had an overall length of 70.5 feet, a breadth of 20 feet, and a depth of 11.4 feet. The deckhouse on the main deck began about 15 feet from the stem and extended aft about one-third ship's length. It contained the wheelhouse foremost and a cabin with galley aft. Below the main deck were a berthing space in the forecastle, the engineroom, the fishhold, and a small lazarette 4/ aft, which contained the steering gear. The berthing space had a hatch in the overhead for access to the main deck. A stairway extended from the berthing space up to the cabin on the main deck. The cabin had a door that opened directly to port and another door aft. A third door in the cabin opened into the wheelhouse, which was up a short stairway forward.

Access from the main deck to the fishnold was through a 4-foot by 6-foot hatch on a 2-foot-high coaming. Whenever the vessel was used for scallop fishing, a removable steel cover was placed over the hatch to prevent scallops piled on deck from falling into the fishhold below. Access to the fishhold also could be gained through a hole cut in the watertight bulkhead between the fishhold and the engineroom; the hole was used to check the stuffing box 5/ in the fishhold for leaks whenever the vessel was underway.

Access to the engineroom was through a door from the berthing space. A raised hatch with a cover on the main deck aft provided access to the lazarette. In the bulwarks along the main deck were several freeing ports with screens, which permitted water on deck to run overboard but prevented the loss of scallops.

4/ A small storage space below the main deck.
5/ A packing arrangement to maintain watertightness for the rotating propeller shaft where it pierces the vessel's hull.

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On the after end of the deckhouse was a mast on the centerline which supported twin booms that extended upward and aft from the base of the mast at an angle of about 50 degrees from the main deck. The tops of the booms, 27 feet high above the main deck, were braced by two supports secured at the stern of the vessel. Outriggers (shorter booms) were attached at the base of the mast on either side and suspended two submarine-shaped paravanes 18 feet outboard when lowered. The paravanes usually were lowered about 30 feet into the water to stabilize the vessel. Also, each of the outriggers supported and trailed a fish net with two 9-feet by 40-inch, 500-pound steel plates or "doors," which kept the nets on the ocean floor for scallop fishing.

The SANTO ROSARIO's communication and navigation equipment included two Loran-C receivers, a fathometer, radar, single side band radio, VHF-FM radiotelephone, CB radio, and a magnetic compass. The vessel was not equipped with an emergency position indicating radio beacon (EPIRB), 6/ nor was it required to be. There was also a microphone and amplifier in the wheelhouse for the captain to talk to the crew working aft through a speaker mounted on an after boom. By talking near the after boom speaker, a person could transmit a message to the wheelhouse speaker. There was no speaker or alarm in the berthing space.

The vessel was equipped with 2 ring life buoys (1 each on the port and starboard sides of the cabin), 10 life preservers, and a 6-person rigid liferaft held in a fixed position by four metal rods on top of the wheelhouse.

Before departing for the fishing grounds, it was the practice on the SANTO ROSARIO and other local scallop vessels to trim the vessel by the bow to compensate for the anticipated load of scallops mixed with grit, 7/ which would be piled on the main deck aft. The captain estimated that he had a total of about 3,500 gallons of fresh water in the forepeak tank and the adjoining tank forward of the collision bulkhead on the day of the accident. His side tanks outboard of the engineroom were about three-fourths full with a total of about 7,500 gallons of fuel oil. He always kept his side tanks outboard of the lazarette empty to provide buoyancy aft.

The vessel had a single bilge pump, which took suction from the lazarette, the fishhold, and the engineroom. The captain testified that the pump was in good condition and that the only place where minor leaks had occurred was at the stuffing box in the fishhold. The last reported leak was stopped a week before the vessel sank. Just as the vessel left the pier on its last trip, the captain was informed that the lazarette was dry and the hatch was closed. The captain testified that he had inspected the fishhold and engineroom about 1 1/2 hours before the capsizing and found them dry.

Method of Operations

The SANTO ROSARIO was on a regular fishing schedule during the summer harvest season supplying calico scallops to the Canaveral Seafood Company at Port Canaveral. The vessel was making five 18-hour round trips a week with the same crew to and from the fishing ground, as were about 19 other vessels that also were shrimp trawlers converted for scallop fishing. About 3 weeks before the accident, the captains of all 20 fishing vessels employed in this operation met with the company plant manager and agreed to a fixed unloading time requirement of 1 1/2 hours at the pier for each vessel

6/ A device which when activated transmits distress signals on frequencies monitored by commercial and military aircraft and by some satellites.
7/ A mixture of mud and sand brought up from the ocean bottom with the scallops.

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regardless of its size and to a particular unloading schedule for each vessel. Each vessel had to be loaded sufficiently during its fishing operation to meet the unloading time requirement at the pier, or the vessel would be denied unloading services. Too large a load would require a longer unloading time, which would permit the scallops to spoil in the hot sun. Too small a load would require a shorter unloading time, which would be uneconomical for the company because the automatic shucking machine would have to be stopped more frequently. The 1 1/2-hour unloading time at the pier, which the fishing vessels had been complying with for about 3 weeks, caused many of the vessel captains to overload their vessels to meet this requirement and bring their vessels into port with large trim by the stern and reduced freeboard aft. (See figures 2 and 3.)

Although the vessels had been designed to stow shrimp on ice in the hold below deck, the fishermen were required to pile the calico scallops on their main decks so that a mechanical clamshell shovel at the pier could scoop them off directly to feed the automatic shucking machine. This method of stowing the catch is different from that of the deep-sea scallop trawlers that operate in colder waters. Those fishing vessels have larger crews to hand-shuck the scallops and stow them on ice in the hold.

The captain of the SANTO ROSARIO testified that he was carrying an 8-foot-high deckload, equivalent to about 700 gallons of shucked scallops, when the vessel overturned. He said the vessel appeared to be loaded properly and could carry the two full tail bags from the last tow to ensure an unloading time of 1 1/2 hours at the pier. His outriggers had been extended outboard and the stabilizers lowered. The scallop pile had been flattened on top between net loads by the deckhands using shovels and was sloped to the 38-inch-high bulwark on each side of the vessel. The captain testified that on this trip there may have been more grit than usual in the deckload. Both deckhands working on deck stated that the vessel's freeboard aft was about 6 to 10 inches, which was less than normal, and that the trim of the vessel aft was greater than usual.

Medical and Pathological Information

The captain of the SANTO ROSARIO suffered from shock and from nerve damage to his injured left forearm and hand, which required extensive care. The winch operator, as a result of exposure, developed pneumonia and was hospitalized until he recovered. The after deckhand received lacerations and bruises in his attempt to climb aboard the bottom of the vessel. He was given first aid and then released.

The body of the third deckhand was recovered after the accident. An autopsy attributed the cause of death to drowning.

Survival Aspects

The captain of the SANTO ROSARIO had tried to back out of the starboard door of the wheelhouse as the vessel capsized but fell against the port door as the vessel began to overturn. He kicked loose the bottom dog, which held the port door shut, but the water pressure slammed the door on his left arm, pinning him until the vessel was overturned. When the pressure on the door equalized after the wheelhouse flooded, he freed himself. He surfaced, climbed onto the vessel's overturned bow, and crawled back along the keel to the stern, where he found the winch operator. When the vessel capsized, the winch operator had been forced against the starboard bulwarks but managed to surface without being trapped. As the vessel was overturning, the after deckhand fell into the ocean and the deckload of scallops fell about him. He surfaced, swam to the overturned stern, and held onto a projecting transducer on the hull until he was hauled aboard the vessel's bottom by the other two survivors. The sleeping deckhand did not escape. Neither the liferaft, ring life buoys, nor any of the life preservers stowed in the cabin floated free.

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Figure 2.--Scallop fishing vessels approaching and departing pier.

Figure 3.--Scallop fishing vessels approaching and unloading at pier.

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At 0448 on July 23, 1984, the Coast Guard station at Port Canaveral (Port Canaveral CG), about 37 nmi from the scene, received a message from an unidentified vessel that a trawler had overturned and that the trawler CAPTAIN ED could tell them more. At 0502 the captain of the CAPTAIN ED reported to Port Canaveral CG the details of the sinking and the rescue of three survivors. He gave the time and position of the accident, depth of water in fathoms, the names and addresses of the survivors and the missing deckhand, and a description of the injuries. He also reported that the captain of the SANTO ROSARIO was in shock.

During the passage to the dock, the CAPTAIN ED and Port Canaveral CG were both in radiotelephone communication with Coast Guard Group, Mayport, Florida (Group Mayport), about 102 nmi northwest of the accident site. Port Canaveral CG communicated more often with the CAPTAIN ED as the vessel proceeded to port, whereas Group Mayport kept requesting additional information from the CAPTAIN ED on the injured persons in order to evaluate the need to send a helicopter for an airlift. In addition to radio watchstanders using radiotelephones, the officers of the day at Group Mayport and Port Canaveral CG communicated with each other as the case developed using telephones and a direct intercom system.

The captain of the CAPTAIN ED testified that he:

> . . . requested a diver and also requested a helicopter to come pick up [the captain of the SANTO ROSARIO] because I thought he had broke ribs and his arm -- I thought his arm was broke, too, and they said, "Well, we will check into this," and he came out of shock in about 30 minutes or so and he said, "Cancel the chopper to pick me up," he said, "I will ride on in with the crew," and so I called back Mayport and cancelled the chopper. I cancelled the chopper and anyway, I called back again to the Coast Guard to try to get some divers back to check because he told me that there was a man aboard and I said, "Did this man get off the boat," and he said, "No, he is down in the forepeak," and so I told the Coast Guard that there was a man aboard that they should get somebody out there to check this out. I said he might be air locked in that boat and they might be able to get this man out, and they said, "We will check into it." I called twice on this incident and they still said they would check into it.
>
> * * *
>
> So I got the crew aboard and the Coast Guard told me to keep in touch with them every thirty minutes, which I did. Every thirty minutes I called and gave the nature of the men, the condition of the men all the way in until I talked to the dock over here to Red Beard's where we get fuel and stuff and an ambulance came there then and took them to the hospital.

As a normal means to formally inform some echelons of the Coast Guard of the distress case, on July 23, 1984, Port Canaveral CG sent out two situation reports (SITREPS) to Group Mayport for action and to the Commander, Seventh Coast Guard District (CCGD SEVEN), Miami, Florida; to the Marine Safety Office (MSO), Jacksonville, Florida; and to the Coast Guard station at Ponce de Leon Inlet, Florida (Ponce Inlet CG), for information. The 0651 SITREP ONE included a statement, "the F/V CAPT ED stated that Howard Morrison was asleep in the forepeak and went down with the F/V SANTO ROSARIO." The 1435 SITREP TWO included the quote from the captain of the SANTO ROSARIO, "There was one other man aboard, Howard Morrison who was asleep in the

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forepeak at the time the boat rolled over. My personal opinion Howard Morrison went down." At 1430 MSO Jacksonville sent a message for action to the Commandant, Coast Guard, Washington, D.C., and for information to CCGD SEVEN which included, "the missing crewman was presumed to be in the vessel's fo'c'sle sleeping... F/V SANTO ROSARIO sank in about 30 minutes."

The nearest available Coast Guard helicopter was located at Clearwater, Florida, about 170 nmi away or about 2 hours flying time from the scene. Group Mayport did not order a helicopter either to airlift the survivors or to search for the missing deckhand. Neither were the nearest Navy divers requested from the U.S. Naval Reserve Training Command at Orlando, Florida, about 75 nmi away.

The Coast Guard did not ask the CAPTAIN ED to search the area where the SANTO ROSARIO sank and to remain there until relieved by a rescue unit. If the vessel had stayed near the scene, the injured survivors probably could have been airlifted in about 3 hours, and the vessel would have been available to assist the missing deckhand had he surfaced. However, the CAPTAIN ED stayed at the scene for only a short time before departing with the injured survivors for Port Canaveral.

Although Port Canaveral CG had two 41-foot rescue boats available, Group Mayport did not order one to go to the scene and begin a search. The officer of the day at Port Canaveral CG testified that it would have taken a boat about 2 hours to reach the search area. Ponce Inlet CG, about 40 nmi northwest of Port Canaveral CG and also under Group Mayport command, had heard the message traffic of the distress. Because the accident site was located in this station's rescue area, a ready rescue boat was prepared to depart, but no orders came from Group Mayport to send it. Neither the unidentified vessel that first reported the accident nor any fishing vessels that may have been in the area were alerted to search for the missing deckhand. Group Mayport's decision not to send either a helicopter or rescue boat was based on the information furnished by the captain of the CAPTAIN ED that immediate medical attention was not needed for any of the survivors and that the deckhand asleep aboard had gone down with the SANTO ROSARIO in 150 feet of water.

On the day following the sinking, a fisherman friend informed the captain of the SANTO ROSARIO that he had sighted oil surfacing in the area where the vessel sank and gave him the Loran readings and fathometer depth at that position. That evening, the captain arranged for a professional scuba diver to search for the sunken vessel and the body of the third deckhand. On the the next day, the diver located the vessel 146 feet below the surface and found the body at the steps which led up from the forward berthing space to the cabin and wheelhouse. The water temperature at the sea floor was 57° F. There was no air found trapped in the vessel. According to information listed in Coast Guard regulations (33 CFR 181.705), a person in 70° F to 80° F water could be expected to survive from 3 hours to indefinitely and in 57° F water from 1 to 6 hours.

Tests and Research

Stability.--The Coast Guard calculated the intact stability of the SANTO ROSARIO for three assumed loaded conditions on the morning of July 23, 1984. 8/ The stability calculations were based on the hull form developed from the admeasurer's offsets, since no line drawings of the vessel were available, and from these data the hull was digitized and computer modeled. The displacements and the heights of vertical centers of gravity (KGs) were estimated based on those of similar vessels. Figures for the fuel and fresh water loads were based on testimony of the captain.

8/ "F/V SANTO ROSARIO Stability Analysis," U.S. Coast Guard Marine Technical and Hazardous Materials Division, Washington, D.C., January 15, 1985.

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The following three intact loading conditions were evaluated:

1. The estimated loading condition just before loading scallops on deck;

2. The estimated loading condition with 41.6 tons of scallops on deck plus 2.0 tons of scallops in a tail bag on deck and 0.5 ton of scallops submerged, hanging on the port boom; and

3. The estimated loading condition with 41.6 tons of scallops on deck with 2.5 tons suspended on booms (2.0 tons on starboard boom in air, 0.5 ton on port boom submerged).

Table 1 summarizes the results of the calculations for each condition of loading, and figure 4 shows the vessel's righting moment curves. A heeling moment of 5.6 foot-tons was imposed on condition No. 3 to simulate a reported initial roll to port, and the residual stability is presented as condition No. 4 in table 2 and in figure 4.

Table 1.- Stability of the SANTO ROSARIO.

Condition	Displacement (long tons)	KG (feet)	GM 1/ (feet)	Mean draft (feet)	Trim aft (feet)
1	136.5	9.8	10.6	8.7	4.5
2	180.6	11.57	1.04	9.5	9.9
3	180.6	11.82	0.8	9.5	9.9

1/ GM is an acronym for the distance between a vessel's vertical center of gravity (G) and its transverse metacenter (M). GM is a measure of a vessel's ability to right itself after being affected by an overturning moment. The greater the GM is for a given vessel at a given displacement, the more righting moment the vessel has.

The three intact loading conditions and that for the residual condition induced by imposing the 5.6-foot-ton heeling moment on condition No. 3 were compared to the stability criteria recommended for fishing vessels over 79 feet in length contained in Coast Guard Navigation and Vessel Inspection Circular (NVIC) No. 3-76. 9/ (See table 2.) These criteria have been endorsed by the International Maritime Organization (IMO) and are contained in the Torremolinos International Convention for the Safety of Fishing Vessels, 1977. They were issued to provide guidance to naval architects, marine surveyors, and others involved in the design of fishing vessels. The IMO stability criteria were developed for fishing vessels over 79 feet long, and although they may not be exact enough for the SANTO ROSARIO, they were the best available. The criteria should be used with knowledge of this limitation.

9/ Superseded by NVIC No. 5-85 on June 3, 1985, which also republished the International Maritime Organization stability criteria for fishing vessels.

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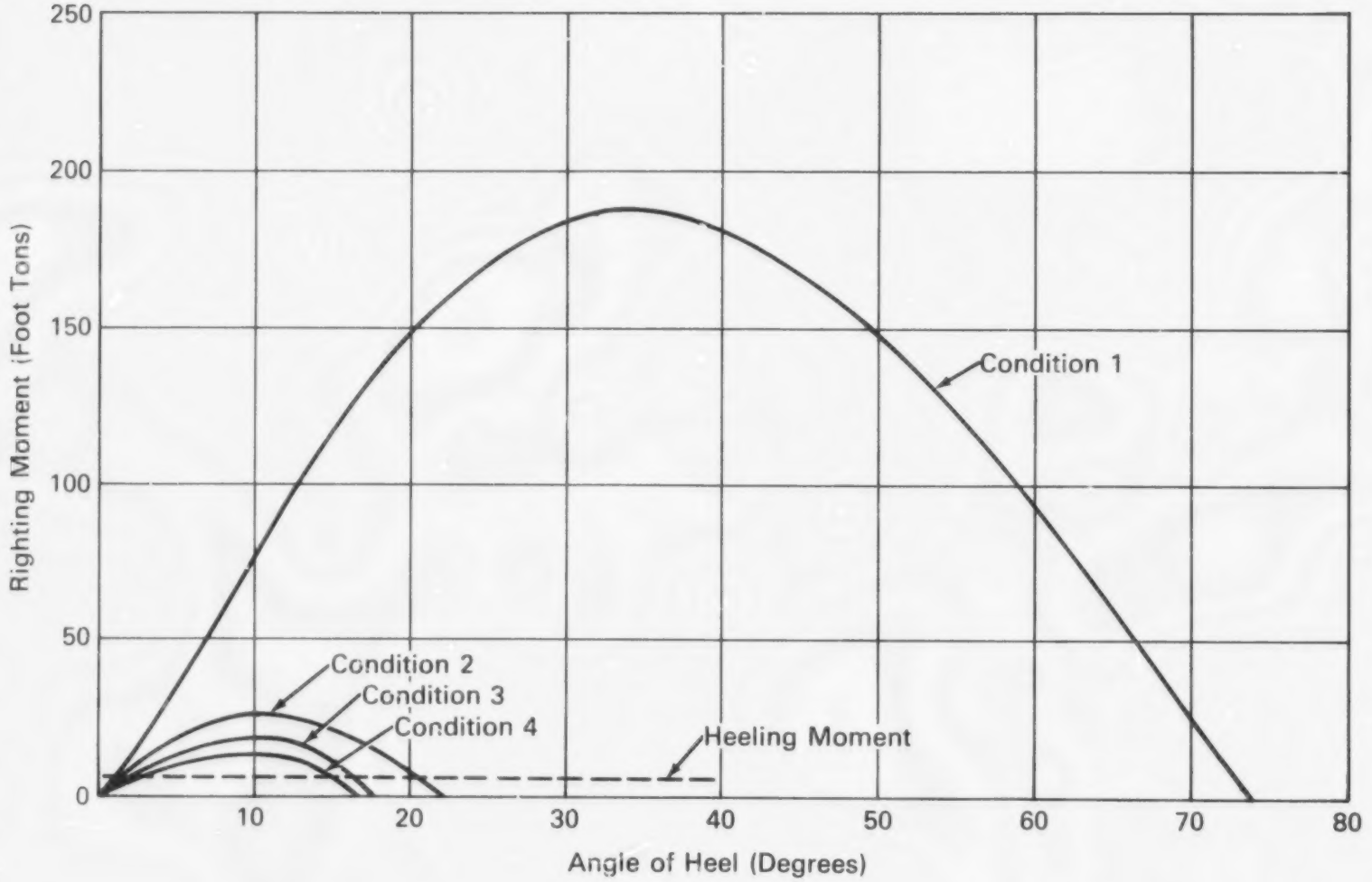

Figure 4.--Righting and heeling moments determined by the Coast Guard for the SANTO ROSARIO.

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Table 2.-- Stability comparisons with IMO recommendations.

Category	Loading Condition of SANTO ROSARIO 1	2	3	4	IMO recommendations
Initial GM (ft)	10.6	1.04	0.8	0	1.15 minimum
Area under righting arm 1/ curve (foot-degrees)	61.9	2.60	1.17	0.69	10.3 up to 30° and 16.9 up to 40°
to angle of heel (degrees)	74°	22°	18°	17°	
Maximum righting arm (feet)	1.37	0.15	0.103	0.074	Max. RA to occur at 25° or greater and be at least 0.656 foot at 30° or greater
at angle of heel (degrees)	33°	11.5°	10.5°	10.5°	

1/Righting arm (RA) is righting moment divided by the respective displacement.

The vessel met all the criteria for condition No. 1 before it loaded scallops, but not for any of the other intact conditions. As an uninspected vessel the SANTO ROSARIO was not required to meet these criteria. The Coast Guard stated that these criteria do not ensure stability for any dynamic events that might occur, such as the shift in the pile of scallops, the pendulum effect of the starboard tail bag with the deckhand hanging on it, the free surface effect of slack tanks, water in bilges, and the action of the wind and waves.

Case Study.--A study of the frequent capsizing of scallop trawlers off Port Canaveral was made by a student working toward a master of science degree at the Florida Institute of Technology. 10/ Stability analyses of typical calico scallop fishing vessels were made using a microcomputer and computer programs developed for the study. Data were analyzed using the IMO criteria and the U.S. Navy wind-heel criteria. 11/ The results showed that all the scallop trawlers operating out of Port Canaveral do not meet these criteria mainly due to the loading of the scallops on the main deck. The thesis concluded:

> Many of the operators in the scallop fleet are not knowledgeable with regards to stability and loading. Since the industry is not regulated in any way, there are few standards for these operators to follow. The Coast Guard publishes excellent Navigation Circulars, but the utilization of this information by operators seems minimal.

The researcher reported that between the years 1979 and 1981 there were 19 sinkings or capsizings off the Florida coast among shrimping and scallop vessels reported to the Coast Guard. The accidents resulted in the deaths of three fishermen and losses of over $1 million.

10/ "A Case Study: Fishing Vessel Stability and Loading" by Douglas Brian McGuffey, March 1984.

11/ Applied wind moments to a vessel varying as the cosine of the heel angle for up to 100 knots of wind. "Design Data Sheet 079-1 Vol. 2,, Stability and Buoyancy of U.S. Naval Surface Ships."

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Other Information

Local capsizings.-- The captain of the SANTO ROSARIO stated that in the years 1982 and 1983 there were five capsizings of scallop trawlers operating out of Port Canaveral. Most of the accidents occurred in the harbor to fully loaded vessels. Some of the loaded vessels were so limited in stability that they rolled over when their outriggers were raised. On one occasion in 1982 when the SANTO ROSARIO was fully loaded with calico scallops on deck, it rode up on a sunken piling, which caused the vessel to roll over on its side and lose the catch just before reaching the unloading pier.

On September 4, 1984, the 83-foot-long fishing vessel NOAH SMITH capsized and sank while fishing for calico scallops in the Atlantic Ocean about 54 nmi south of the position where the SANTO ROSARIO sank. Four crewmembers were rescued by a nearby fishing vessel. The Coast Guard concluded in its investigation, "the proximate cause of the casualty . . . was a loss of stability produced by the deck load of scallops coupled with adverse heeling moments to starboard produced by the shifting weight of the bag of scallops."

Coast Guard Search and Rescue.--The National Search and Rescue Manual (SAR Manual), which sets the policies and procedures to be followed for search and rescue operations by Coast Guard stations, is promulgated by the Coast Guard for use of all U.S. Federal forces, military or civil, participating in search and rescue operations. The following excerpts relate to this accident:

> Section 739 Risks vs. Gain Factor
>
> SAR facilities are responsible for taking whatever action they can to save life at any time and place where their facilities are available and can be effectively used. Nevertheless, there is a limit beyond which SAR services are not expected and cannot be justified. Known and inherent risk must be carefully weighed against the mission's chances for success and the gains to be realized. SAR personnel and equipment should not be jeopardized, nor the mission attempted, unless lives are known to be at stake and the chances for saving lives are within the capability of the personnel and equipment available.
>
> All reasonable action shall be taken to locate distressed personnel, determine their status, and effect their rescue. ---
>
> * * *
>
> Section 751 Surface Vessel SAR Incident
>
> A surface marine SAR incident is considered imminent or actual [12/] when any of the following conditions exist:
>
> (a) A surface vessel has requested assistance.
> (b) A surface vessel has transmitted a distress signal.
> (c) It is apparent that a vessel is in distress.
> (d) A surface vessel is reported to be sinking or to have sunk.
> (e) The crew is reported to have abandoned ship or is about to do so.

12/ In general an SAR incident is considered imminent or actual when it is apparent that persons are or may be, in distress or when a request for assistance has been received.

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(f) Reports indicate that the operating efficiency of the craft is so impaired that the craft may sink or the crew may be forced to abandon it.

(g) The surface vessel is overdue or unreported.

* * *

Section 760 Initial Action of SAR Facilities

After the initial report of an incident is received, evaluated, and assigned an emergency phase, [13/] there are three possible actions the SAR Mission Coordinator (SMC) may take:

(a) Dispatch SAR units immediately, and/or request other facilities to take immediate responsive action.

(b) Alert SAR facilities to a possible mission, but not dispatch Search and Rescue Units (SRUs) immediately.

(c) Neither dispatch nor alert other SAR facilities, but conduct further investigation and evaluation to either confirm validity of the reported incident or determine the need for SAR system support.

Generally, if an incident is classified as an Alert, SRUs may or may not be dispatched; if classified as an Uncertainty, SRUs are not usually dispatched.

Section 11 of the addendum to the SAR Manual covers rescue by marine craft. The situations are grouped into three categories: rescue from the water, rescue from a foundering ship, and rescue from a burning ship. There is no information on rescue from a sunken ship.

13/ From Glossary of SAR Terms, SAR Manual:

Emergency Phases - Phases into which SAR incidents and subsequent SAR missions are classified. See Uncertainty, Alert, and Distress.

Uncertainty Phase - An emergency phase which is assigned when doubt exists as to the safety of a craft or person because of knowledge of possible difficulties, or because of lack of information concerning progress or position.

Alert Phase - An emergency phase which is assigned when apprehension exists for the safety of a craft or person because of definite information that serious difficulties exist which do not amount to a distress, or because of a continued lack of information concerning progress or position.

Distress Phase - An emergency phase which is assigned when immediate assistance is required by a craft or person because of being threatened by grave or imminent danger or because of continued lack of information concerning progress or position after procedures for the Alert Phase have been executed.

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ANALYSIS

The Accident

After the SANTO ROSARIO completed its last tow on July 23, 1984, its stability was critical. The catch of scallops and grit was piled 8 feet high on its main deck, a pair of steel "doors" and a paravane were hung on each outrigger, and the port and starboard tail bags--fully loaded from the last tow--were hung from the tops of the 27-foot-high after booms. The pile of scallops above the main deck, and the suspended weights significantly reduced the vessel's stability. The vessel's righting moment was so reduced that the combined off-center loading of the suspended port tail bag, the shift of the top of the pile of scallops to port caused by the moving starboard tail bag, and the sudden swing to port by the moving starboard tail bag with the after deckhand hanging on were enough to roll the vessel on its side. The vessel had no righting moment past 20° heel to resist these moments, and the vessel continued to be rolled further by the off-center moment of the sliding scallops until it overturned. About 15 minutes after overturning, the SANTO ROSARIO sank. An access opening in the bulkhead separating the engineroom and fishhold permitted rapid progressive flooding in the hull.

The SANTO ROSARIO, like 19 other fishing vessels working for the Canaveral Seafood Company in Port Canaveral, was a shrimp trawler that had been converted for scallop fishing. In its conversion, sturdier rigging, nets, and heavier "doors" were substituted for the lighter fishing equipment used to catch shrimp. The effects of these additional weights placed high on the vessel raised the vessel's center of gravity, which decreased the ability of the vessel to right itself. Further, the stability of the vessel was greatly reduced before the accident by loading the catch of scallops on the main deck instead of in the fishhold below. The 1 1/2-hour unloading time requirement at the fish pier, which had been in effect for about 3 weeks, encouraged the captain of the SANTO ROSARIO to load excessively to ensure himself that he met this time requirement. The deckhands had noticed that the freeboard aft of only 6 to 10 inches was less than usual and that the vessel had a steeper trim angle. The stability calculations performed after the accident show that the SANTO ROSARIO's stability was well below recognized international standards when fully loaded with scallops.

In the interim to prevent further sinkings of these converted shrimp trawlers and possible loss of life, a reduction in pierside unloading time is needed so that the vessels are not dangerously overloaded. The owner and operators of the Canaveral Seafood Company and the captains of the vessels employed in the operation should meet in the interest of safety to establish a shorter unloading time per vessel that will not require the vessels to load to dangerous levels on deck.

For the long term, the Safety Board believes that other alternatives should be investigated to make the calico scallop fishing industry safer. These include: a vessel designed solely for this method of fishing that is capable of carrying scallops and grit without critically affecting vessel stability; modifications to existing vessels to improve their stability; and improvements in the method of loading calico scallops on or in vessels, in the method of preserving calico scallops while aboard, and in the method of unloading calico scallops at the fish pier.

Survival Aspects

The captain of the SANTO ROSARIO was unable to broadcast a distress message before the vessel sank. No one might have become aware of the vessel's plight if the captain of the CAPTAIN ED had not missed sighting its navigation lights and wondered

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why he lost its radar contact. Only through the alertness of the captain of the CAPTAIN ED were the three fishermen on top of the overturned hull promptly rescued. While he was backing away from the SANTO ROSARIO after getting the survivors safely aboard his vessel, the SANTO ROSARIO plunged to the bottom, carrying with it the deckhand who was still aboard. Had not the CAPTAIN ED been about 1 nmi away and in earlier communication with the SANTO ROSARIO, the three survivors also might have perished. The Safety Board believes that it is a safe practice for fishermen to operate their vessels in groups or in pairs whenever possible, so that they can communicate with each other and be available quickly to provide assistance in emergencies.

The captain and two deckhands escaped and managed to climb onto the bottom of the overturned hull, but they did not have time to alert the deckhand who was sleeping below. Had he been warned in time, he also might have escaped. Just before the vessel overturned, the captain was in the wheelhouse close to the speaker amplifier system which served the after deck. Had a speaker or alarm been installed in the forward berthing space, the captain might have been able to warn the deckhand below, although in this case it might not have been necessary because of the violent rolling of the vessel. However, the Safety Board believes that the installation of a speaker or alarm in berthing spaces, operable in the wheelhouse on fishing vessels, would be effective in alerting off-duty crewmembers who are below deck of an emergency.

The SANTO ROSARIO had sufficient floatable lifesaving devices, but none was effective in aiding the survivors. The vessel overturned so quickly that no one had time to get to the life preservers, which were stowed in the cabin of the deckhouse. The life preservers, the two ring life buoys on either side of the wheelhouse, and the six-person liferaft on top were too well secured to the vessel to float free. None of the fishermen was trained in the use or stowage of lifesaving equipment. If the SANTO ROSARIO had sunk before the three survivors were rescued, they might have perished because they would have had nothing to support them in the water. The liferaft could have floated free had it been secured with spring-tensioned grips and a hydraulic release, one of several methods now required for liferaft stowage on U.S. merchant vessels. Similarly, the ring life buoys could have floated free if they had been secured in hydraulic release-operated frames or had been lying flat in an open box. The life preservers would have been more readily available to the crew if some had been stowed in the wheelhouse and in a storage locker on deck. The Safety Board believes that ring life buoys and liferafts on fishing vessels should be stowed so they can float free and that additional life preservers should be located near work areas where they can be readily available.

Shortly after receiving information about the sinking of the SANTO ROSARIO, the officers of the day at Group Mayport and Port Canaveral CG communicated with each other. Since no one aboard the CAPTAIN ED heard or saw the missing deckhand after the SANTO ROSARIO overturned and sank, everyone at the scene assumed that he had gone down with the vessel, and this information was passed to the Coast Guard. Based on this information, Group Mayport CG apparently decided to assign the emergency to the "uncertainty phase." Therefore, divers were not sent to the scene even though they were requested by the captain of the CAPTAIN ED. Assuming that the missing deckhand did, in fact, go down with the vessel, the Coast Guard's decision was appropriate considering the depth and temperature of the water in the accident area and the time needed to assemble and transport qualified divers to the scene. It simply would have taken too long to respond and organize a successful rescue. Therefore, the Safety Board does not believe that the Coast Guard's conduct in the case contributed in any way to the loss of life.

However, in evaluating the safety lessons in this accident, the Safety Board is concerned that the Coast Guard may not have had enough information to assume that the missing deckhand had, in fact, gone down with the vessel. First, the Coast Guard relied

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on statements from the captain of the SANTO ROSARIO, who was clearly traumatized by the accident and possibly was in shock. Second, the CAPTAIN ED conducted only a brief search of the area while it was still dark. Given this uncertainty, the Coast Guard should have taken additional actions before placing this emergency in the "uncertainty phase." At a minimum, the Coast Guard should have attempted to contact other vessels (including the unidentified vessel that originally reported the emergency). In addition, the Coast Guard should have either dispatched a search and rescue unit from Ponce Inlet CG to assist in the search or considered sending a helicopter to pick up the three survivors while the CAPTAIN ED continued to search for the missing deckhand.

This accident investigation is not the first case in which the Safety Board has noted deficiencies in Coast Guard emergency response procedures. As a result of its investigation of the capsizing and sinking of the 68.7-foot-long fishing vessel LOBSTA I in 1978, 14/ the Safety Board on April 24, 1980, issued Safety Recommendation M-80-25 to the Coast Guard:

> Determine the most effective means to utilize on-scene Coast Guard resources to rescue persons trapped within a capsized vessel, and determine how these resources can be augmented, adopted, or trained for more effective use in such rescues.

On December 22, 1980, the Coast Guard replied:

> The Coast Guard concurs with this recommendation. We have taken steps to insure that field personnel are aware of current procedures to be utilized when handling SAR cases involving capsized vessels. We issued Commandant Instruction 3100.5 on August 27, 1979, entitled, "Capsizing; Procedures in Event of." This instruction went into considerable detail prescribing action for both survival and rescue techniques to be employed in the event of a capsizing . . . . We plan to review Commandant Instruction 3100.5 periodically to insure that necessary updating is accomplished.

These instructions covered on-scene rescue techniques; however, no information was provided for deciding when to initiate the rescue. The Safety Board classified Safety Recommendation M-80-25 as "Closed--Acceptable Action" and accepted the Coast Guard commitment to review the instruction periodically to insure necessary updating.

About 12 hours after the LOBSTA I capsized, it was sighted by the tankship ANGELA F. Although a delay occurred in initiating a search, a Coast Guard helicopter dispatched to the scene later sighted the capsized vessel, but it sank before a Coast Guard cutter could reach it. An extensive search in the area was conducted, but no survivors were located. Later, a photographic survey was made of the vessel, which was located at a 234-foot water depth. Consequently, the Safety Board issued Safety Recommendaton M-80-26 on April 24, 1980, to the Coast Guard:

> Review the Coast Guard's rescue coordination for this accident and improve the rescue coordination procedures to provide a more timely response. Include provisions for more effective coordination with local fishing vessel operators who may assist in search and rescue efforts.

14/ Marine Accident Report--"Fishing Vessel M/V LOBSTA I Capsizing and Sinking in Atlantic Ocean, Point Judith, Rhode Island, September 23, 1978" (NTSB-MAR-80-6).

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On December 22, 1980, the Coast Guard replied:

> The Coast Guard does not concur with this recommendation . . . . We do not believe that the criticism that the Coast Guard's response was untimely is warranted . . . . It must be remembered that every notification received by Rescue Coordinating Centers (RCC) is not necessarily a cause for dispatching of mobile units. In cases of obvious distress, such as a receipt of a MAYDAY or SOS, the decision to launch can be and is, made very rapidly. The launching of mobile SAR units instantly and automatically in each case, without an evaluation of the information received, would be neither feasible nor wise . . . . In the LOBSTA I casualty, the initial report from the ANGELA F . . . was neither a "distress call" nor a "call for assistance," but rather a report of a hazard to navigation.

On February 22, 1982, the Coast Guard forwarded to the Safety Board copies of the instructions for duty officers in RCCs, which are contained in chapters 2 and 3 of the National SAR Manual. Upon review of these instructions, which include the responsibilities of mission coordinators, on-scene commanders, and search and rescue units, the Safety Board classified Safety Recommendation M-80-26 as "Closed--Reconsidered" and concluded that the problems identified in the LOBSTA I search and rescue effort were due more to a lack of training of the SAR personnel than to inadequate established procedures.

In light of the circumstances in the SANTO ROSARIO sinking, the Safety Board is concerned that current Coast Guard policy and procedural guidance in this area is inadequate. Therefore, to provide consistency in initiating searches for personnel in sunken vessels and to increase the capability to save lives, the Board believes that all Coast Guard rescue stations should have specific guidance as to when to initiate a rescue for persons trapped in sunken vessels. The National SAR Manual provides no such guidance. The Board believes that if guidance were added to the manual, the personnel at the rescue stations could make better decisions on when and under what circumstances to initiate a rescue.

Stability Standards for Fishing Vessels

As a result of its investigation of the capsizing of the 82-foot-long fishing vessel PATTI-B in 1978, 15/ the Safety Board on June 25, 1979, issued Safety Recommendation M-79-69 to the Coast Guard:

> Conduct a design study to determine if current published intact stability criteria are adequate for vessels similar in design to the PATTI-B.

On December 16, 1980, the Coast Guard replied that ". . . there is no fully satisfactory stability standard . . . for small vessels like the PATTI-B. . . ." The Coast Guard has "encouraged research into the seakeeping characteristics of small vessels on the international level, but is no longer able to continue small vessel research due to limited funds and other priorities." The Board classified Safety Recommendation M-79-69 as "Closed--Acceptable Alternate Action," but urged the Coast Guard to reevaluate its position with regard to such research.

15/ Marine Accident Report--"Grounding and Capsizing of the Clam Dredge PATTI-B, Ocean City Inlet, Ocean City, Maryland, May 9, 1978" (NTSB-MAR-79-9).

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In its investigation of the AMAZING GRACE accident in 1984, 16/ the Safety Board concluded that the Coast Guard should reconsider its priorities and resume its seakeeping research on small vessels, and on August 12, 1985, issued Safety Recommendation M-85-67 to the Coast Guard:

> Resume research into seakeeping characteristics of small vessels to develop stability standards for fishing vessel such as the AMAZING GRACE.

On January 8, 1986, the Coast Guard replied:

> The intent of this recommendation is concurred with. The Coast Guard recognizes the serious problems with fishing vessel stability and has conducted important research in past years. Clearly, additional research is needed. Research will provide more insight into the design and operational aspects of stability, but it may eventually show that some current fishing vessel designs are not appropriate for the service in which they are being used. While we will continue to conduct and support research, many segments of the fishing vessel industry, including vessel operators, vessel designers, insurance companies, professional societies, and academic institutions through the Sea Grant program share this responsibility. Faced with tight budgetary constraints, decreasing research authorizations, and requirements to plan further reductions in manpower resources, the Coast Guard must now focus its available resources on those areas of marine safety which have been legislatively mandated by Congress. However, all future stability research which may be conducted will include fishing vessel considerations in the planning stages to assure an end use which will be as broad as possible. The Coast Guard will actively encourage others to support research as well. . . .

The Safety Board classified Safety Recommendation M-85-67 as "Open--Unacceptable Action," and stated that unless the Coast Guard is willing to establish the standards for fishing vessel stability, the Safety Board believes that this problem will remain unsolved, and the lives of fishing vessel crews will continue to be at risk.

The SANTO ROSARIO was initially built in 1973 for shrimp fishing, and in 1979 it underwent a conversion for calico scallop fishing. The installation of heavier nets and rigging added to the vessel's lightship displacement and raised its center of gravity. However, no stability test or deadweight survey was conducted, and no stability information was prepared. The Coast Guard requires that a stability test be conducted after major modifications are made to inspected vessels, but the Coast Guard has no authority to require fishing vessels to have a stability test either when it is built or after completed modifications.

In 1968 the Coast Guard first published voluntary stability standards for uninspected commercial fishing vessels. The voluntary standards contained recommendations for stability tests and stability information, and were improved and republished in 1976 and again in 1985. However, commercial fishing vessels continue to be operated without adequate stability information, as typified by this case where the captain of the SANTO ROSARIO was unaware of the effects on stability of the vessel's modifications and of loading calico scallops on the main deck. The Safety Board continues to believe that the

16/ Marine Accident Report--"Loss of U.S. Fishing Vessel AMAZING GRACE about 80 Nautical Miles East of Cape Henlopen, Delaware, about November 14, 1984" (NTSB/MAR-85/07).

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high number of stability-related fishing vessel accidents shows that voluntary standards are ineffective and that statutory requirements are necessary. Therefore, the Board reiterates Safety Recommendation M-86-11, which it made to the Coast Guard as a result of its investigation of the loss of the U.S. fishing vessels AMERICUS and ALTAIR in 1983. 17/

> Seek legislative authority to require that stability tests be conducted and that complete stability information be provided to the captains of commercial fishing vessels.

The SANTO ROSARIO accident illustrates the need for stability standards for the small vessels fishing off the Florida coast for calico scallops. The captain had no guidelines or instructions for keeping his vessel in a safe condition, and had to rely upon experience. He lacked information on such specifics as operating drafts and trim, distribution of liquids on board, and loading of his catch. Without this information he could only guess when to stop loading his vessel and still have sufficient stability to safely reach port. The Safety Board recognizes that fishermen need to know the stability characteristics and proper loading of their fishing vessels, which should be provided by their owners, and that the Coast Guard should continue seakeeping research into stability standards for small vessels like the SANTO ROSARIO.

Emergency Position Indicating Radio Beacon

Without the assistance provided by the CAPTAIN ED, the rescue of the three fishermen from the ocean after the SANTO ROSARIO sank would have depended on how successful they might have been to alert a passing airplane or vessel. The SANTO ROSARIO carried no EPIRB to signal the location of the disaster, nor was it required to have one. The vessel capsized so quickly that only an EPIRB that could activate automatically and float free would have been effective.

In 1980 the Safety Board issued Safety Recommendation M-80-23, which recommended that the Coast Guard seek legislative authority to require EPIRBs on fishing vessels. This recommendation was issued as a result of the Board's investigation of the capsizing and sinking of the LOBSTA I. In 1985 this recommendation was reiterated to the Coast Guard as a result of the Board's investigation of the loss of the AMAZING GRACE. The Coast Guard is now preparing proposed legislation for the annual submission of proposed legislation by the U.S. Department of Transportation to the Office of Management and Budget (OMB) for review. The proposed legislation will require uninspected vessels operating offshore, including fishing vessels, to carry EPIRBs. If approved by the OMB, the proposed legislation is scheduled for consideration by Congress in 1987. Legislation to require EPIRBs for fishing vessels only may be introduced during the 1986 session.

Crew Training

The SANTO ROSARIO crew received no formal training in their vocation. All their knowledge of fishing and vessel operation was gained only through on-the-job training under guidance of former captains and shipmates. The captain spent 17 years as a deckhand, mate, or operator on many types of vessels before he became the captain of the SANTO ROSARIO. His training in stability of vessels by former captains probably was

17/ Marine Accident Report--"Capsizing of the U.S. Fishing Vessel AMERICUS and Disappearance of the U.S. Fishing Vessel ALTAIR, Bering Sea North of Dutch Harbor, Alaska, February 14, 1983" (NTSB/MAR-86/01).

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very limited. To keep the SANTO ROSARIO employed, the captain had agreed to piling the scallop catch on the main deck sufficiently to meet the 1 1/2-hour unloading time at the pier, and he apparently did not know the danger in which he would place his vessel. He had no owner-furnished information on the stability of the SANTO ROSARIO. While operating to meet these requirements on July 23, 1985, his vessel became marginally stable, when he believed that it was properly loaded to meet the time limit. Likewise, the three deckhands probably had little information on vessel stability and depended solely on the captain's judgment for the safe loading of the vessel.

As a result of its investigation of the AMAZING GRACE accident, in which the Safety Board recognized the need for a mandatory education program for fishermen, the Board issued Safety Recommendation M-85-68 on August 12, 1985, to the Coast Guard:

> Seek legislative authority to require the licensing of captains of commerical fishing vessels, including a requirement that they demonstrate minimum qualifications in vessel safety including rules of the road, vessel stability, firefighting, watertight integrity, and the use of lifesaving equipment.

On January 8, 1986, the Coast Guard replied,

> This recommendation is not concurred with. In February 1984, the Coast Guard recommended a Fishing Vessel Safety Initiative to the Secretary of Transportation to reduce the number of casualties in the uninspected commercial fishing fleet. The Secretary endorsed the initiative and progam development began in the spring of 1984. The Coast Guard established a Fishing Vessel Safety Task Force to study how best to reduce the number of uninspected commercial fishing vessel casualties. Included in the various alternatives considered to implement the initiative was mandatory licensing of vessel operators. After a review of all alternatives, a two-pronged approach was chosen, a Voluntary Vessel Standards Program and a Safety Awareness/Education Program. . . .
>
> A voluntary approach was chosen after balancing the need for attention based on the fishing industry's safety record, the desire of the fishing industry, the current resources of the Coast Guard, the likelihood of receiving additional resources, the administration's deregulatory policy, and the Coast Guard's belief that a voluntary program will be successful. . . .
>
> A Safety Awareness/Education program was chosen because it has a strong possibility of being endorsed by the fishing community, especially if they are active participants in its development. . . .

The Safety Board classified Safety Recommendation M-85-68 as "Open--Unacceptable Action," and has asked the Coast Guard to reconsider its position on this subject. Voluntary standards have not been successful in the past, and the Board believes that mandatory licensing would be more effective. Therefore, the Board reiterates Safety Recommendation M-85-68 to the Coast Guard.

Also as a result of its investigation of the AMAZING GRACE accident, the Safety Board issued Safety Recommendation M-85-82 on August 12, 1985, to the National Council on Fishing Vessel Safety and Insurance:

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Promote through your organization and your member organizations:

(1) The training of fishing vessel captains and their crews, as appropriate, in basic safety such as stability, watertight integrity, firefighting, and the use of lifesaving equipment;

(2) The determination of the stability characteristics of fishing vessels by their owners and the provision of guidance to fishing vessel captains on proper loading. . . .

As of the date of this report no response to this recommendation has been received from the National Council on Fishing Vessel Safety and Insurance. Therefore, the Safety Board reiterates Safety Recommendation M-85-82 to the National Council on Fishing Vessel Safety and Insurance.

CONCLUSIONS

Findings

1. The SANTO ROSARIO was marginally stable and below accepted international standards when the full tail bags were hauled up on the last tow before it overturned.

2. The off-center loading of the suspended port tail bag and the shift of the scallop pile on deck caused by the moving starboard tail bag commenced the vessel's roll to port.

3. The weather was moderate and was not a factor in the accident.

4. The SANTO ROSARIO overturned so fast that the master had no time to alert the sleeping deckhand below deck and to radio for help.

5. There is a need for crews of fishing vessels to have training in vessel stability and the use of lifesaving equipment.

6. The liferaft and life rings on the SANTO ROSARIO were ineffective since they did not surface as the vessel plunged.

7. Had life preservers been stowed in the work areas on the SANTO ROSARIO, they would have been available for use by the survivors.

8. If the fishing vessel CAPTAIN ED had not been nearby, the three surviving crewmembers might have perished.

9. The National Search and Rescue Manual should include procedures for personnel at Coast Guard stations to follow for deciding when and under what circumstances to assist persons who may be trapped in capsized or sunken vessels.

10. The 1 1/2-hour dockside unloading time agreed to by the Canaveral Seafood Company and the local fishermen is too long and causes unsafe overloading of some scallop fishing vessels.

11. There is a need for the development of a calico scallop fishing vessel designed so that crewmembers can safely load scallops and grit on deck.

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Probable Cause

The National Transportation Safety Board determines that the probable cause of the capsizing and sinking of the fishing vessel SANTO ROSARIO was the agreement between the fishermen and the Canaveral Seafood Company to pile enough scallops on deck to accommodate 1 1/2 hours of pierside unloading time, which reduced the stability of the vessel to the point that a small shift in the vessel's deckload capsized the vessel. Contributing to the accident was the practice of using converted shrimp trawlers for scallop fishing, which do not have sufficient stability for this type of operation. Contributing to the death of the sleeping fisherman below deck was the lack of any means to warn him before the vessel overturned.

RECOMMENDATIONS

As a result of its investigation of this accident, the National Transportation Safety Board reiterated Safety Recommendations M-85-68 and M-86-11 to the U.S. Coast Guard and Safety Recommendation M-85-82 to the National Council on Fishing Vessel Safety and Insurance. Also, as a result of its investigation of this accident, the National Transportation Safety Board made the following recommendations:

-- to the U.S. Coast Guard:

Add information to the National Search and Rescue Manual for assisting personnel at Coast Guard stations in determining when and under what circumstances to initiate a rescue of persons who may be trapped in capsized or sunken vessels. (Class II, Priority Action) (M-86-38)

--to the Canaveral Seafood Company:

In cooperation with fishing vessel captains and a naval architect, establish a safe loading for all fishing vessels furnishing you with calico scallops to eliminate the capsizing hazard caused by the overloading of these vessels. (Class II, Priority Action) (M-86-39)

--to the National Council on Fishing Vessel Safety and Insurance:

Promote through your organization and your member organizations:

(1) The installation of a speaker or alarm in the crew berthing spaces on fishing vessels that is operable in the wheelhouse so that persons below can be alerted to an emergency, and

(2) The practice of stowing ring life buoys and liferafts so they can float free and of locating additional life preservers near work areas where they can be readily available.

(Class II, Priority Action) (M-86-40)

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BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JIM BURNETT
Chairman

/s/ PATRICIA A. GOLDMAN
Vice Chairman

/s/ JOHN K. LAUBER
Member

/s/ JOSEPH T. NALL
Member

April 18, 1986

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APPENDIX

CREW INFORMATION

Captain Thomas M. Gaede

Captain Thomas M. Gaede, 42, had been going to sea since he was 17 years old. After spending 4 years in the U.S. Navy, he worked as a deckhand, mate, or operator on charter boats, yachts, towing, and fishing vessels. Since 1976 he had owned or operated party fishing boats, shrimp trawlers, and swordfish and scallop vessels from the Gulf of Mexico to Nova Scotia, Canada. He had been captain of the SANTO ROSARIO for 5 years. He held a Coast Guard license as operator of vessels of not more than 100 gross tons from Cape Hatteras, North Carolina, to Cedar Key, Florida, not more than 100 miles offshore. He was not required to have a license to be captain of the SANTO ROSARIO.

Crewmember Fred Thorkilsen

Crewmember Fred Thorkilsen, 47, the winch operator, had been working as a captain, mate, cook, and deckhand, mostly on scallop trawlers, for 30 years. For the past 2 1/2 years, he had been fishing for calico scallops out of Port Canaveral. He had been aboard the SANTO ROSARIO 1 month.

Crewmember Perry Ryan Davis

Crewmember Perry Ryan Davis, 40, the tail bagman, had been aboard the SANTO ROSARIO for 3 weeks. He had about 10 years of fishing experience, mostly as a crewmember on scallop and shrimp trawlers and fishing vessels and had been captain of a fishing vessel for a few months.

Crewmember Howard Morrison

Crewmember Howard Morrison, 47, had been a cook, helmsman, and general utility man aboard the SANTO ROSARIO. He had been aboard for about 2 weeks and had about 5 years of fisning experience as a crewmember on fishing vessels.

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